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## ORIGINAL ARTICLES.

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### CHEMOTHERAPY IN DISEASES OF THE EYE.\*

BY PHILIP SKRAINKA, M.D.,  
ST. LOUIS, MO.

Chemical medication has been known for centuries. It fills our formularies which are still enriched by organic chemistry. But the majority of the remedies in our pharmacopias are directed against symptoms; one produces sleep, another stimulates the heart, and still another assuages pain. The remedies which cure can be quickly counted. What can be cited after mentioning quinin and mercury?

The chemical medication of to-day, as illustrated in the labors of so thorough an investigator as Ehrlich, is the search for the equivalents of quinin and mercury, which shall be capable of destroying the pathogenic microbes, without damaging the cells of the organism. In theory and in practice, this is nothing else than chemistry applied to therapeutics.

Chemical remedies ought to be antiseptic by their power of sterilization. When the antiseptic properties of corrosive sublimate became known, Koch essayed to inject a solution into guinea-pigs affected with carbuncles, so as to destroy the bacteria, but the animals promptly died. This simple experience showed the difficulties inherent in the problem. Corrosive sublimate could not be employed to sterilize a living animal since it destroyed the cells of organs at the same time that the microbial cells were destroyed. On the other hand, quinin is an ex-

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cellent remedy because it acts on the parasites in the red corpuscles without affecting, at least as a general thing, the corpuscles themselves.

The revival of chemotherapy is due to a number of reasons. The first which should be mentioned is the idea which Pasteur instituted, and which amounted to this: When a disease is due to a germ, when this germ is known, and when with it one can inoculate an animal and thus transmit the disease in the laboratory, we arrive at experimental therapy. This experiment on an animal yields far deeper study for us than clinical observation. But the advance attained in microbiology seemed at first to relegate chemical medication to a secondary place, for the marvelous biological remedies, preventive and curative, which were discovered—vaccines against anthrax, against rabies, and serotherapy—surpassed as regards specificity and efficacy all the drugs mentioned in our pharmacopias. Hence with this knowledge in mind should our conclusions be that all infectious diseases should be treated according to these ideas?

Let us at once dismiss the thought that in vaccination and in serotherapy we have the wherewithal to combat all infectious diseases. There is a group of infectious diseases for the cure of which vaccination and serotherapy have yielded no results. These are the protozoal diseases. The serum of an animal easily affected by the trypanosome of sleeping sickness and immunized against this trypanosome, exercises no curative action on the disease experimentally produced in other animals. Against animal trypanosomiasis, nagana, virus attenuated by heat, weakened by age and by having been passed through various sorts of animals, results only in prolonging the period of incubation, after which the disease runs its normal course. And as regards paludism all biological methods have failed, quinin still remaining the supreme medicine. When these results were brought home to investigators, it was decided that instead of working on a vaccine or serum for protozoal diseases, it was incumbent upon them to direct their researches to the finding for each protozoal disease of an equivalent of that supreme drug—quinin.

The discovery of the microbes, the necessity for finding for protozoal diseases other remedies besides vaccine and serum, were seconded by the development of chemistry, especially applied chemistry. The manufacture of coloring matter prepared the way for experimental medicine. Investigators began to vary the remedies with which they experimented, as they had varied

different colors, and chemotherapy, in a number of instances, was really chromotherapy.

The methods of research which the investigators pursued consisted in associating the experiments on the living animal with the reactions of organic chemistry. For example, we know that a certain substance has a distinct quality or property; and that each molecule of this substance has a nucleus on which may be grafted second atomic groups. After ascertaining that the chemical property which one wishes to utilize belongs to one of these groups, the group is varied, displaced and another group is substituted. Experiments teach us the chemical properties of the new composition and we learn the connection of its molecular structure with its therapeutic qualities. If we recall the formulas of benzene, toluene, benzoic alcohol, orthocresol, we will understand what is accomplished by substitution and the various changes in chemical properties which result therefrom.

Ehrlich has rendered a great service to medicine by associating more closely than has hitherto been done, the technique of the chemist, and the experiments *in vivo* of the biologists. One idea dominates all his researches, whether old or new, and that is that the explanations of vital actions must be by means of the mechanisms of the reactions in organic chemistry. He has shown by his stereochemical formulas the reciprocal action of those substances whose chemical action has been almost completely overlooked—namely, toxins and anti-toxins. He has divided protoplasm into atomic groups, and as a sequel to the anatomy and physiology of tissues and organs he has conceived a special kind of molecular anatomy and physiology of the cell. The cell, according to Ehrlich, is a world unto itself, wherein many functions are accomplished by continual exchanges between the protoplasm and the outside world. Each of these functions is represented by a group or "lateral chain" capable of entering into a chemical alliance with corresponding groups of substances such as aliments, poisons, and other medicaments. All the vital phenomena are involved in these exchanges, which are really the phenomena of nutrition, be it a matter of the assimilation of albumin, the introduction into the organism of serum to render it immune, or quinin so that a hematozoön may be destroyed.

For a substance to act on a cell, whether an organic or microbial cell, it is necessary for it to attach itself to the protoplasm. There is no phenomenon which ranks with the same importance in the minds of biologists with this matter of fixation, this physical phenomenon of molecular adhesion according to some, or the

chemical phenomenon of the "side-chain theory" according to others. Ehrlich claims that the cell prone to tetanus possesses receptors for the tetonic toxine; and by analogy advances the idea that such a microbial cell has also receptors for quinin, arsenic and mercury. These statements show that this investigator believes in the phenomenon of affinity, and that without this underlying idea his experiments would soon come to a close.

Antitoxin which is injected into a patient has an affinity only for the corresponding toxin. But the arsenic which we inject into a patient attacked with sleeping sickness has an affinity, at the same time, for the parasite and for the cells of the organs involved. As Ehrlich has put it, arsenic is parasitotropic and organotropic. There it is necessary to weaken as much as possible the dangerous affinity, so that the salutary affinity may be strengthened; in short, the problem of chemical substitutions. This is a matter of great importance in the treatment of protozoal diseases but it is also of considerable importance in bacterial diseases.

We all know what is meant by elective affinities. Ehrlich has for some time demonstrated that methylene blue possesses a special affinity for living nerve fibres. So well is this affinity illustrated that when methylene blue is injected into a living animal, which is afterwards killed, the dissection will show the nerve fibres as fine lines of blue ink. On injecting the same color into a frog the parasites which are found in the body are colored in the same fashion. Some granular cells are colored by choice a neutral red; others a pyrrol blue. Nerve cells take one color, fat cells another; but according to Ehrlich the colorations are more or less specific. Ehrlich ere long applied these principles to medication and asserted that to cure syphilis a chemical composition which colors electively Schaudinn's spirochaete pallida, without coloring the other cells, must be found.

Arsenic is one of the oldest remedies. Before the time of Dioscorides and Pliny it had already been in use by the Chinese. In 1900 Lingard, an English veterinary, who practised in India, treated the equine disease, known as surra, by means of arsenous acid and effected some cures. Bruce used it in Africa in cases of nagana, and it was even administered in the sleeping sickness of human beings before it was known that the disease was caused by the trypanosome. In the laboratories, Lavern and Mesnil studied experimentally the action of arsenous acid, in sleeping sickness, which was employed alone or associated with other chemical medicaments. From the time that it was known that

sleeping sickness was caused by the trypanosome, arsenical treatment was used, but arsenous acid proved too toxic.

The discovery of trypanred and the first successes obtained with chromotherapy, would have delayed the use of arsenic on the part of physicians if W. Thomas, of Liverpool, had not begun to use atoxyl in 1905. Atoxyl was discovered by Béchamp in 1863, but was not used for medical purpose until 1902. It contains 24 per cent. of arsenic, and is more slowly eliminated by animals that tolerate it well, than by those that are rather intolerant of it. The elimination by the urine occurs six hours after its administration, and the quantity eliminated amounts to about one-half of the dose. Of all the organs the liver appears to retain the largest quantity of arsenic. Although atoxyl is nearly thirty times less toxic than arsenous acid, large doses cause nephritic disturbances, and above all, optic nerve lesions, which result in total blindness. Non-toxic atoxyl would be a perfect remedy.

In executing in his laboratory chemical variations on this arsenical theme, Ehrlich produced a series of compositions of which the first from the standpoint of toxicity, was 1,500 times more poisonous than the last. Three compositions, superior to atoxyl, were discovered: The first was acteyl atoxyl, which is known as arsáctin; the second, was arsenophenilglycin, labeled 418 in the laboratory and which was from two to four times less toxic than atoxyl; and the third, was arsenobenzol, which is popularly known as "606".

The experimental study of syphilis is of recent date, that is, since the time when Metchnikoff and Roux succeeded in inoculating the anthropoid ape, which presented not only the initial lesion but secondary symptoms resembling those which appear in man. By the discovery of the specific microbe in 1905, Schaudinn gave us the best opportunity for prosecuting experiments in the line of inoculation and treatment. Six years ago physicians would have been astounded that the diseases due to trypanosomes and spirochaetes would be treated almost by the same remedy. But there were analogies to guide the minds of the investigators, since for some time it was known that the venereal disease of horses, dourine, was due to *trypanozoma equiperdum*. On the strength of this fact, Schaudinn traced the relationship between trypanosomes and spirochaetes; and convinced that a protozoön can only be thoroughly understood by following it through the evolutionary cycle, he studied as a zoologist hematazoa and found in their development trypanosomic and spirochæ-

tic forms. Hence, when he discovered the spirochæte pallida, he was fully prepared to believe and affirm.

Investigators have discussed at great length the affinities of this new microbe, that is, whether it is protozoal or bacterial. These researches have had the fortunate result of concentrating the minds of investigators on a problem which is more closely allied with medical practice than was at first thought.

The science of medicine has always been possessed of the idea of an abortive treatment that would destroy the germ before the disease had a chance to develop. Ehrlich hopes to accomplish this by what he calls "therapia sterilans magna," a cure at the onset of the disease which was expected by investigators in the case of sleeping sickness. Already examples to this effect have been forthcoming, but they are not the rule, for the cure by one injection is a difficult ideal to attain, since there is no medicine however remarkable which will not illustrate a number of refractory cases. Nevertheless many physicians of standing, men like Wechselmann, of Berlin, Alt of Uechtspringe, Schrieber of Magdeburg, and Iversen of St. Petersburg, all at the head of hospitals with abundant material, have evinced enough enthusiasm to give us pause.

What bearing has this recent discovery on certain diseases of the eye which though benefitted and occasionally cured by mercury and the iodide evince only too often that the treatment though rigorous has not resulted in a condition that would be considered gratifying to the oculist? From foreign sources, which up to the present are the most trustworthy, we glean that unlike atoxyl, arsenobenzol is innocuous so far as the optic nerve is concerned. When one recalls that over 10,000 cases have thus far been treated in European hospitals, for secondary and tertiary lesions, with no cases of blindness following the injection the conclusions to be drawn must be the reverse of what they were when atoxyl held its brief sway in the medical world. Neisser in the *Deutsche Medizinische Wochenschrift* of October 13th, writes as follows: According to my opinion atoxyl and Ehrlich's arsacetin, as well as all the preparations which belong to the atoxyl group,—and here I include somin and hectine—should be dropped as therapeutic agents. These five arsenical preparations are not only ineffective, even when large doses are prescribed, but there is always danger atrophy of the optic nerve. But it is a different matter when we consider the action of arsenophenylglycin and especially arsenobenzol. Both preparations are effective in syphilis but with this difference—namely, arsenobenzol

being less toxic than arsenophenylglycin. Arsenobenzol is in fact a preparation by means of which a great advance has been effected in the therapy of syphilis and has moreover displaced mercury in many conditions because of its undeniable and quick action in destroying the spirochaetes. Schanz writing in the *Münchener medizinische Wochenschrift* of November the 8th, says: My observations in five cases of keratitis parenchymatosa are these: One of the cases having received the injection yesterday I shall not comment upon it. Of the other four cases, the disease in one was in its incipency, in two the opacity was increasing and had already involved more than half of the cornea, and the fourth the cornea was clearing up. In all these cases the presence of lues was established either from the history of the case or from certain luetic manifestations on the bodies of the patients. In none of the cases was it possible to note a decided influence on the progress of the disease during the first week or two after the injection. In the three cases where the process was advancing, the opacity increased. Here evidently was a luetic condition which was not influenced by arsenobenzol. But in extenuation of these failures I would add, that it may be that on account of the peculiar nutritive conditions of the cornea, a medicine that is so quickly voided by the urine as is arsenobenzol is ineffective in reaching the spot where the disease obtains. Even when mercury and the iodides are used, it cannot be said in all fairness that the disease is brought to a standstill. But in the case in which the keratitis was in its incipency, the results were better. After the first injection, there being no improvement, I insisted upon making another, but the patient was compelled to leave before this was done. After a few days the patient returned and I noted that the inflammatory process had ceased and the opacities were clearing up. I know of no case of keratitis parenchymatosa in which the progress of the disease has been so quickly stopped and a return to normal conditions so quickly brought about. I also had the opportunity of observing a case of luetic iritis. Lues had been acquired a year before. Inflammatory condition pronounced and the synechiæ numerous. A few days after the injection of arsenobenzol the inflammation ceased, the synechiæ having been loosened by atropin. This cure was effected in 8 days.

In the *London Practitioner* for November, J. E. R. McDonagh, Surgeon to Out-Patients, London Lock Hospital, records the following case: Case 5 was one of special interest owing to the fact that eye complications were known to supervene after using

the arylarsonates. The patient besides having the usual symptoms of secondary syphilis had a bad iritis of the right eye. After an injection of 0.45 grm. the photophobia had almost entirely disappeared in twenty-four hours, and three days later nothing beyond a slight conjunctivitis was perceptible. The pupil was circular, reacted normally and there were no synechiæ.

Besides the above cases which show the potency of arsenobenzol and also its impotency, it would be well to add the following: Neisser's case of optic neuritis, which he treated with 0.20 gram., cure rapid and complete; Wechselmann's 6 cases of optic neuritis which were very badly affected by the injection and in which vision returned ad integrum; Glueck's case of iritis with synechiæ in which the photophobia disappeared in two days and the eye was normal inside a week; and his case of atrophy of the optic nerve without evident results; Doerr's case of diplopia with partial paresthesia, cured in three weeks; Igersheimer's case of keratitis parenchymatosa not influenced by the injection; and Michaelis's case of an old lues in a woman, who among other pre-ataxic symptoms, had a commencing papillary atrophy which greatly improved after one injection, the Argyll-Robertson pupil disappearing.

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#### CAUSAL TREATMENT OF EYE DISTURBANCES.

O. Haab (*Correspondenz-Blatt für Schweizer Aerzte*, Oct. 20, 1910) points out the fact that the eye, being practically part of the skin, has, like the skin, a tendency to such diseases as herpes, eczema, acne, variola and pemphigus. Not only may these diseases develop in the eye but other diseases may send their toxins to the eye. The more constitutional the origin of the eye affection the more likely are both eyes to be involved. The Wassermann reaction and the tuberculin tests are of signal service in differentiating the constitutional dyscrasia responsible for the eye disease and thus preventing improper treatment. Such differentiation will prevent the administering of potassium iodid in cases of eye affections which, clinically, may look syphilitic lesions, but really are of tubercular origin. Specific treatment in such cases is contraindicated and tuberculin and general measures are required. He insists that with scrofulous eye affections systematic constitutional treatment is indispensable.

ON A CASE OF EPITHELIOMA GROWN ON A  
PTERYGIUM.

By M. WIENER M.D., AND A. ALT, M.D.,  
ST. LOUIS, MO.

The specimen to be described in the following was sent me by Dr. M. Wiener with the following notes:

"Mr. F. C., of Ashmore, Ill., presented himself at my office October 16th, 1910, for consultation on account of a small tumor which was growing on his right eye.

He stated that about four years previously he had consulted an oculist in Eastern Illinois on account of a small growth extending from the inner canthus of the right eye to just a little over



FIGURE 1

the corneal margin. This physician called it a pterygium and cauterized it.

The result of this cauterization proved very evanescent, as the tumor promptly returned. About a year later it was again cauterized by another oculist. The result of this cauterization was not very much better than of the first one. In about six months a new growth made its appearance, as a thickened and red spot on the site of the former tumors. This became slowly but steadily larger.

When I saw him I found a small growth at the nasal corneal margin. Its color was grayish white. It was cone-shaped, about 3 mm. in diameter and 1.5 mm. high.

After the abscision of the tumor the surrounding conjunctiva

was undermined and brought together with two sutures. The healing was uneventful.

The specimen was turned over to Dr. A. Alt for microscopical examination."

On section the small tumor proved in the main to be an epithelioma with a slightly papillomatous arrangement (See Fig. 1). Numerous epithelial pegs grew downwards into the infiltrated tissue underneath it. The surface of the little tumor was slightly exulcerated.

Since in some sections the tissue underlying the tumor showed the peculiar matted appearance and the more bluish red stain which I am accustomed to find denoting a pterygium in specimens stained by haematoxylin-eosin, and in view of the history

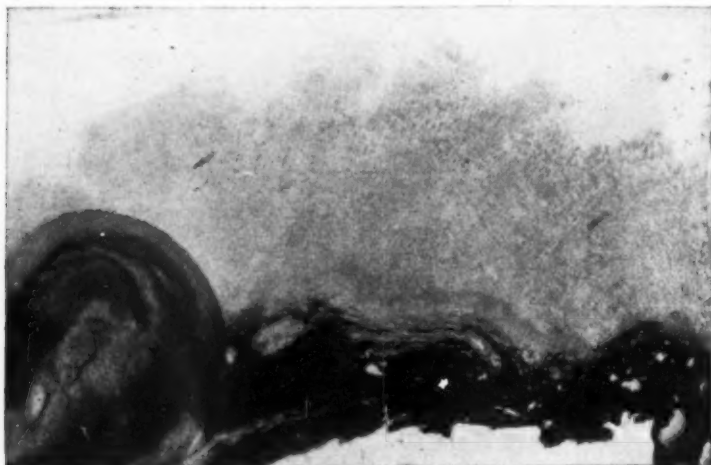


FIGURE 2

given by the patient, I stained a number of specimens with acid orcein for elastic tissue.

As is seen in Figure 2, a very large and condensed amount of elastic tissue was thus disclosed, forming the basis on which the epitheliomatous tumor had grown.

From this it is seen that the pterygium had not been destroyed by the cauterization. It would be interesting to know whether there was already an epitheliomatous growth when the first cauterization was made, or whether the repeated cauterization may have had something to do with the origin of the epithelioma. A number of cases of epitheliomata, proven by microscopic examination, in which I cauterized have been cured. Perhaps, the former operators in this case were afraid to cauterize deep enough and instead of destroying the epithelial tissue stimulated its growth by their interference.

## TRANSLATIONS.

### THE CLINICAL, PHYSIOLOGICAL AND PATHOLOGICAL VALUE OF THE FLUORESCENCE IN THE EYE AFTER EXHIBITION OF URANIN.\*

(From Prof. L. Heine's clinic at Kiel.)

BY ARNOLD BURK, M.D., Assistant.

Translated by A. Alt, M.D.

In order to study the current of the fluids within the eye, and especially the source of the aqueous humor, experiments on the eyes of animals have frequently been made. Most of these studies go back to a distant period and they have not been repeated because the investigators had of necessity to ask themselves, whether their result could really be applied to the human eye.

Moreover, when during the experiment the eye was wounded as by the introduction of a fine canula or by the injection of fluid causing alterations in space and pressure, the physiological stream of the fluid in so subtle an organ must have been, or at least might have been, changed from the norm so that the results of such experiments were in the majority of the cases doubtful. Especially the experiments in which the iris and ciliary body were torn out can hardly be considered and the fight about their value is useless. Some of the experimentors have themselves regretted the necessary lesion. We must, furthermore, be especially doubtful about the condition found in the dead eyeball.

Ehrlich went by another route which avoided any mechanical interference in the eye itself by the subcutaneous injection of uranin, an easily dissolved coloring matter, in rabbits. The appearance of a fluorescent line in the anterior chamber, 10 minutes after the injection, prompted the conclusion that the aqueous humor comes from the anterior surface of the iris, and from the position and form of this line he assumed two centres of secretion. Ehrlich, furthermore, observed that an eye which had been operated on retained the green color much longer than a normal one, and he proposed experiments on man with uranin.

By further studies and modifications of these experiments Schoeler and Uthoff arrived at the contrary opinion, that under normal condition the posterior and anterior chambers are not separated from each other by the iris and that the renewal of the aqueous humor continually takes place in the posterior

\*Klin. Mtsbl. f. Augenhlk., October, 1910, p. 445.

chamber. The anterior surface of the iris does not take part in the renewal of the aqueous humor, the secretion comes from the bloodvessels of the ciliary body and the posterior surface of the iris, the so-called "secretion angle."

Then Hamburger from his experiments with uranin concluded that in the rabbit the pupillary edge effectively closes the anterior chamber and that an increased pressure is necessary to overcome this closure.

Since no agreement could be come to by these experiments, especially since they could not be performed on the living human eye, every method which shows a new way to the solution of this question must be welcomed. Thus Hamburger advised the ingestion of uranin per os and found the behavior of the coloring substance in eyes with an intraocular inflammation, materially differing from its behavior in normal eyes. He therefore hoped that uranin might become of value in questions of diagnosis.

To solve this question I have made experiments with uranin on a great number of eye patients and during the course of these experiments I have arrived at the conclusion that, aside from the diagnosis, this method may throw some light not only upon physiological but also on pathological conditions.

To adults I gave in the morning 5.0 g. of uranin in coffee, to children 3 to 4 g. During the next few hours the patients remained under continued observation (focal illumination with daylight through a hole in the shutters, ophthalmoscope with daylight). Both pupils, as much as possible, were kept of the same width.

Without fail the skin began to get yellow and the urine brown yellow in about one-half hour. The height of this general yellow coloration was usually reached in 2 hours and had disappeared after 8 to 10 hours. Except vomiting in a few cases, nothing untoward was noticed.

In healthy eyes a yellow coloring of the conjunctiva comes on with the height of the skin coloration. After about 6 to 8 hours the iris takes on a greenish sheen, usually at a time when the skin coloration is disappearing. A distinct coloring of the aqueous humor never appears; when it appears it is the sign of a disturbed intraocular circulation. In the rabbit's eye, too, Ehrlich's line does not appear after exhibition of uranin per os.

I want to state here that in diseased eyes a green coloration beyond the normal is regularly found wherever there is an inflammatory hyperæmia. This makes it possible to make use of

uranin for diagnostic purposes. We may even hope in many a doubtful case to find the presence and the site of a possible inflammatory process. To this it can not be objected that a diffusible substance is not very adapted to the study of the current of the fluids since we deal here simply with the difference of its action in a healthy and a diseased eye. The anterior chamber of an eye with iritis becomes green, that of a healthy eye is not colored at all. Since the coloring substance is the same the difference can arise only from altered conditions of secretion.

In light cases of superficial keratitis the conditions are as in the normal eye. Injection at the limbus leads to a green color at this place, vascularized parts of the cornea are colored. In phlyctenular keratitis a green stripe is seen in the otherwise uncolored cornea. The color penetrates for a small distance into the infiltrated and as yet not vascularized tissue. With trachomatous pannus the partial coloration of the cornea is equally well demonstrated. Erosions and ulcers without vascularization are not colored. According to the degree of simultaneous inflammation the iris and the aqueous humor, also, are stained green, yet the color of the cornea is always predominating, in contradistinction with the uranin color in parenchymatous keratitis, where on account of the participation of the deeper vessels we always (visible in the lightest cases even) find a strong coloration of iris and aqueous humor. The cornea, here too, is stained only where it contains bloodvessels. In an old, healed keratitis parenchymatosa, which showed only a barely recognizable seam of circumcorneal injection, a delicate green ring only was visible in the limbus.

The difference between the healthy and a diseased eye is most pronounced in acute iritis. About 15 minutes after the exhibition the pupil begins to become evenly green (not starting from the pupillary margin), a little later the iris and aqueous humor. In two to three hours the coloration reaches its height, and iris and aqueous humor are of a bright green color. This disappears after eight to ten hours, the iris color the last. The degree of green staining corresponds to the hyperæmia of the iris. In a slight case of iritis, iris and aqueous humor are little stained. As the iritis recedes so does the color. Since even with a very slight hyperæmia there is still a slight coloration as a sign of the circulatory disturbance, the uranin method may be used as an indicator of a perfect cure. In more than one case of cyclitis in which precipitates could be scarcely found with the binocular microscope, a slight fluorescence of the eye was not wanting.

In one case of tuberculous cyclitis after prolonged treatment the microscope proved that all praecipitates had disappeared. At the beginning of the disease the green color was intense. Two weeks after the discharge uranin was given once more and a slight yet doubtless green color in the left eye proved that the disease was not perfectly cured. With a very high magnification only several delicate praecipitates could now again be seen. With the last praecipitates only did the green color, too, disappear.

For the physician, therefore, who is not in possession of as accurate a microscope as is the Zeiss binocular, the uranin staining may be of value when all signs have disappeared which can be recognized by the ordinary means. Since the color is also visible in an eye with sympathetic ophthalmia, it may be of importance in practice to find out by a simple exhibition of uranin in a case of injury to the eye whether there is any reason for fearing a sympathetic disease in the uninjured eye. In very rare cases the coloration of the aqueous humor does not appear although there are praecipitates.

It is of interest that in cases of iritis although there is apparently a perfect occlusion of the pupil the aqueous humor is colored as much as with an active pupil.

For the recognition of that chronic cyclitis which for the un-armed eye shows only a slight heterochromia uranin is of great value. In a little slower manner than in an acute or subacute iridocyclitis the pupil is but slightly colored, but with focal illumination in daylight it can be easily seen. Thus uranin may help to a differential diagnosis between an inflammatory heterochromia and a simple difference in pigmentation between the two eyes.

While the disappearance of the color is usual after 8 to 10 hours, we have seen a few cases in which the pupil and iris remained green for two or three days. These were cases of chronic secondary glaucoma after occlusion of the pupil in which many years previously an iridectomy had been performed and which showed no recent symptoms, and two cases of detachment of the retina, that is, cases of chronic vascular disease in the eye. In these cases the green color appeared slowly and was not intense.

In a case of acute glaucoma, also, an intense green color was found in iris and anterior chamber. Cases of glaucoma simplex, too, were stained. In one case of glaucoma simplex with focal illumination after one-half hour a green reflex from the pupil was obtained which was certainly much greener than before the

uranin had been given. After one hour the anterior chamber, too, began to get slightly green. After one and one-half hours the fundus appeared clearly yellow green on the atrophic papillæ. This coloration must probably be looked upon as concerning the vitreous body and not the optic papillæ, as was apparent from the yellow appearance of the remainder of the fundus. This color was so plain, that in our experience it could not be due to the minute stain in the anterior chamber. After seven hours both irides were slightly colored. The next day the color had altogether disappeared.

Another case was that of a woman with acute hæmorrhagic glaucoma of the left eye. The right, also, had slightly increased tension and a shallow anterior chamber, but at that time no other signs of glaucoma. Uranin caused an intense coloration of the left iris and pupil in one-half hour. Two hours later the right iris and pupil were so plainly green that the disease in this eye could no longer be doubted. Since the pupils were very much contracted by eserine a coloration of the vitreous body could not distinctly be made out. The color lasted to the evening, but could not be found in the following morning.

As a peculiar way of the beginning of the coloration it was observed in this case and in a case of chronic glaucoma, that not the whole of the iris uniformly took up the stain, but that at first a green ring appeared at the iris root which in the one case gradually grew over the whole iris, while in the other case this ring grew only somewhat broader. In both cases this phenomenon appeared only in the less diseased eye while in the other one the iris was uniformly stained from the beginning. Probably the simplest explanation is that in both cases there was an inflammation of the iris root. We should like especially to point to this in cases of beginning glaucoma. Only future experience can show how often this happens. Sometimes in chronic glaucoma no coloration at all takes place, especially in cases in which the disease has progressed very far.

Coloration of the lens we never saw. With uncomplicated cataract the eyes remained colorless.

On account of the high degree of fluorescence it is impossible to say whether the vitreous body is, also, colored in acute intra-ocular inflammations, as in iris and iridocyclitis. Yet in chronic affections with less intense coloration we can with focal illumination well see whether the fluorescence is exclusively or predominantly in the aqueous humor or whether it is also situated in the deeper parts. In a case with almost cured cyclitis with numerous

dust-like praecipitates in the vitreous body a color in the aqueous humor was just barely perceptible. When the deeper parts were illuminated the pupil appeared quite green. In ophthalmoscopic examination the whole fundus, but especially the optic papilla, was of a yellow color.

The same fluorescence of the vitreous body appeared with detachment of the retina or choroiditis. In the ophthalmoscopic image the phenomenon is especially plain over the white choroidal spots. In disseminate choroiditis the aqueous humor was less colored, in one case not at all. In cases of detachment of the retina the iris usually took on a slight color after four to six hours, and remained so for two days.

Once in a case of disease of the optic nerve a positive result was obtained with uranin. With the one-sided acute optic neuritis and retrobulbar neuritis externally nothing could be seen. After half an hour a yellow green coloration of the optic disc and its cedematous neighborhood began and was very pronounced after two hours. For the casual observer the difference between the healthy and the diseased eye was startling. Contrary to the cases of apparent coloration of the papilla mentioned before in this case the remainder of the fundus had retained its red color. Of course, a simultaneous coloration of the vitreous body could not be excluded. It is worth mentioning that in two cases of binocular choked disc no coloration of the discs could be detected, perhaps, proving that it is not of an inflammatory nature. Simple atrophies of the optic nerve on whatever basis were negative.

Operated eyes can be colored for weeks after the operation.

I want to say a few words about a case of congenital iris change, which will be described elsewhere.

With total atrophy of the anterior layers of the iris in the right eye, where not a trace of a posterior synechia could be found, the iris was crater-shaped, flattened out somewhat after atropin or homatropin and almost altogether after cocain and returned to the former shape after eserine. The pupil with a diameter of from 2 to 2½ mm. enlarged after atropin to 3 mm. only. The sphincter pupillæ was intact and plainly visible in the atrophic iris. There were no signs of iritis. A brother showed the same anomaly, but only partially and no crater-shaped iris. We, therefore, assumed a congenital anomaly the more so since the parents stated that the eye had looked the same since earliest infancy.

Thirty minutes after 5 g. uranin per os the pupil began to fluoresce. With focal illumination the aqueous humor could be

seen fluorescing. With a magnifying lens slight fluorescence in front of the darker atrophic parts of the iris could be made out. Thirty minutes later the left anterior chamber appeared bright green, the right less so. When now cocain was instilled the color of the aqueous humor was not increased in spite of the flattening of the iris. When atropin was instilled before the exhibition of uranin everything turned out the same way.

This is not the place to speak of the crater-shaped iris without posterior synechia; we wish here to draw attention only to the fact that after the elimination of the tone of the sphincter muscle a quicker coloration of the aqueous humor did not make its appearance, thus speaking against the posterior chamber being the sole source of the aqueous humor.

It is difficult in this case to explain the penetration of the coloring substance through the bloodvessels. No signs of an iritis were present. It might be that the bloodvessel walls had also suffered with the great alteration in the iris so that they were abnormally permeable. Thus this case would show that sometimes even without an inflammation the anterior chamber may become colored. On the other hand we cannot forget that, except in this case, all our experiments with uranin showed that the coloration denotes an intraocular inflammation.

To sum up, we see that in the healthy eye a slight green coloration of iris and pupil appears, but only after about 8 hours. We never saw anything resembling Ehrlich's line, never any movement of the color substance in whatever direction even in cases of rapid and intense coloration. The only exception was made by the two simple glaucoma cases with partial coloration at the iris root and gradual and continual spreading within the anterior chamber.

In all intraocular inflammations there is a more or less pronounced passing of the color substance through the altered bloodvessels, according to the degree of inflammation. Sometimes a minimal inflammation is recognized by the fluorescence. In very rare cases it may be wanting. This denotes the often quite marked alterations in the vascular apparatus and shows that the metabolism in an inflamed eye is much more rapid than in a normal one. In an inflamed eye the absorption, also, must be hastened or an increased pressure would have to result. This may explain certain glaucomatous attacks, namely, when in consequence of bloodvessel changes the absorption is deficient and from whatever cause even a mild inflammation is added, an acute attack of glaucoma may result.

That an inflammation may be a link in this chain is shown by the uranin experiment. A simple stasis, as we have seen in cases of choked disc, does not seem to lead to a marked passage of the coloring substance.

That usually the papilla first appears green is due to the fact that here the anterior chamber is deepest and darkest, which gives the best background for observing the fluorescence. It is possible to discern whether the green color of the pupil must be accredited to the aqueous or the vitreous humor, but a motion of the coloring substance through the pupil into the anterior chamber, a passing in small waves, as Leber found in his experiments on rabbits, we have never seen.

The alterations of the physiological current of the fluids produced by operative interference are so rude that in my opinion such observations do not prove anything. It is, also, self-evident that in acute intraocular inflammations we have to deal with important alterations of the current of the fluids which do not permit of conclusions regarding the physiological conditions. Many vessels which otherwise may be of not much importance can then assume abnormal functions so that even the opponents to the opinion that the aqueous humor comes from the iris cannot be astonished when the aqueous humor receives its staining from the hyperæmic iris vessels.

Still from the manner in which the anterior chamber is stained in iritis, the uranin experiment proves that in many pathological cases the iris takes part in the production of the aqueous humor.

We certainly must mention one point, that a coloring of the iris always takes place with that of the aqueous humor, in close observation it appears after even as if the coloring of the iris preceded that of the aqueous humor. The isolated fluorescence of the vitreous body in some cases, too, is remarkable. If the latter (Leber) did receive its fluid only from the ciliary body, like the posterior chamber, it would be impossible to comprehend why sometimes the aqueous and sometimes the vitreous humor is the deeper stained, when both come from the same source. This would force the assumption of at least two separate sources. Therefore, I feel like agreeing with Hamburger's opinion that even under normal conditions the iris takes no part in the production of the aqueous humor. That is not always possible to connect the fluorescence of the vitreous body with an affection of the choroid was shown by the case of cyclitis with vitreous opacities, where there was no sign of choroidal changes.

The green coloring of the vitreous body in cases of detach-

ment of the retina probably proves that there is an inflammatory process going on in its source, the ciliary body. The uranin experiment may, therefore, become of prognostic value for the other healthy eye and if a coloration takes place in this eye it may point to an imminent detachment.

Why the coloring substance is retained so much longer in this than other affections of the eye, is hard to explain. Perhaps the vitreous body retains the coloring substance longer on account of its slow current of fluids, which Schoeler and Uhthoff have proven, as we have to assume a disturbed absorption besides an increased secretion. Then, however, we would need an explanation for the diminished tension in most of these cases. It seems, therefore, best to leave the explanation of this fact to the future.

The retention of the coloring substance in chronic glaucoma seems to be easiest explained by a disturbance in the absorption.

The uranin experiment makes it probable that in the beginning of glaucoma an inflammatory condition exists at the iris root.

Clinically the uranin experiment may be valuable in distinguishing between a superficial and an intraocular inflammation, as, also, in discerning the degree or the cure of an intraocular inflammation. For the recognition of a chronic glaucoma uranin may be useful in some cases, yet a negative result proves nothing. We cannot share Hamburger's hope that uranin will help us to distinguish between an acute glaucoma and iritis, but it will be necessary to make a great many additional experiments.

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## ABSTRACTS FROM MEDICAL LITERATURE.

By J. F. SHOEMAKER, M.D.,

ST. LOUIS, MO.

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### A REPORT OF SIX CASES OF CRESCENTIC ULCERATION OF THE CORNEA, WITH COMMENTS ON THE VALUE OF PEROXIDE OF HYDROGEN IN THEIR TREATMENT.

John Dunn (*Arch. of Oph.*, May, 1910) reports six cases of crescentic ulceration of the cornea treated by him during the past year. The ordinary treatment of such cases, including the application of iodine, actual cautery, subconjunctival injections, etc., failing to check the progress of the disease, he conceived the idea of applying peroxide of hydrogen to the ulcer after rubbing the surface of the ulcer with a cotton-wrapped probe. He did this and then discovered why the remedies had not checked the disease. Immediately after the application of the peroxide "the hydrogen bubbles spread over the surface of the ulcer and into the layers of the cornea to a considerable distance beyond the apparent ulceration, forming therein a white area of small bubbles." This showed distinctly that the infection had spread beneath the corneal epithelium quite a distance beyond the ulceration and hence was not destroyed by the cautery. The application of iodine to this entire area checked the further progress of the disease and the ulcer healed rapidly thereafter as any non-infected ulcer would. After the first application of the peroxide of hydrogen there were no bubbles formed beneath the epithelium with repeated applications of the peroxide, demonstrating that the disease progressed no further after the first application. He used this treatment on the last three cases reported and it checked the progress of the disease at once in all three of them. The peculiarities common in all these six cases were as follows: (1) The inflammation began as minute areas of infection near the corneal periphery, generally at or about the end of the vertical or horizontal meridians; (2) the infection was, at the start, beneath Bowman's membrane; (3) there was little conjunctival irritation and no marked secretion; (4) after two or three days, if left untreated, minute cloudy areas could, under a magnifying glass, be seen near the original

focus; (5) the ulceration spread centrally and peripherally; (6) it seemed averse to spreading centrally, so as to occupy more than one-third or two-fifths of the corneal surface; (7) it spared Descemet's membrane for a long time; (8) it was accompanied by hypopyon only once; [(9) in one case under observation at the same time with the above six, but in the practice of another physician, the ulceration extended peripherally around the entire cornea. It extended centrally, however, no farther than the limits above given. In this case it was bilateral]; (10) the ulceration was obstinate to all forms of treatment until the peroxide of hydrogen had been used; (11) the corneal substance rapidly regenerated after the infectiousness of the ulceration had been stopped, although there was left an amount of astigmatism proportionate in a general way to the extent of the ulceration; (12) dionin hastened the disappearance of the cloudiness after repair had set in.

Dunn's method of treating these cases is to cocaine the eye well, then with a bit of cotton wrapped about a small probe rub firmly the surface over and in the neighborhood of the ulcer. Then touch it with the peroxide of hydrogen, full strength, on a cotton wrapped probe. There need be no effort made to remove the bubbles beneath the corneal epithelium as they disappear of themselves in a short time. Atropin is used twice daily and a boric-acid salve applied every hour. Cold applications are applied unless contraindicated. The peroxide should be used once or twice daily until the ulcer has well started to healing. Such remedies as iodine, the cautery, etc., may be used in addition if necessary, but he believes in many cases it will not be necessary.

#### APPLYING THIERSCH GRAFTS TO THE ORBITAL CAVITY.

F. A. Morrison (*Jr. Ind. State Med. Ass'n*, September 15, 1910) describes his method of applying Thiersch grafts to the orbital cavity, which is as follows:

Over the part to be covered, whether within or without the orbit, is laid a piece of sterile gutta-percha tissue and an exact pattern made of this surface by the use of small scissors. This pattern is now removed and laid aside for further use. Next a piece of gutta-percha tissue two or three inches square (for convenience of handling) is laid in a bowl of normal salt solution. The Thiersch graft is cut in the usual way but is allowed to re-

main on the razor blade and is transferred directly to the gutta-percha tissue. To effect this the tissue is removed from the salt solution and spread evenly on a sterile towel. The upper surface of this tissue must be kept quite moist to facilitate the even application of the graft. The razor blade carrying the graft is dipped gently into the normal salt solution to loosen the adhesion between them preparatory to the next step. The graft then applied, raw surface up, to the tissue by holding the edge with a small spatula and gradually drawing the razor backward and dislodging it. The spatula is now brought into play and all wrinkles are carefully smoothed. Should any difficulty be experienced a few drops of water sufficient to float the graft may be dropped on its surface.

The gutta-percha tissue should then be lifted slowly by taking hold of one end and the excess of water on its surface allowed to drain away slowly. This will cause the graft to become intimately adherent to the surface of the tissue and permit handling without any fear of wrinkling or dislodgment. With a pair of small and sharp scissors the tissue and the adherent graft are cut at the same time to correspond to the size and shape of the pattern previously described. In case great accuracy is demanded the pattern may be placed beneath the tissue while this shaping is proceeding. The graft thus shaped, together with its companion piece of gutta-percha, is then placed face downward on the surface to be covered and pressed into place with the spatula or any convenient instrument. Here the two may be left in contact or if desired the tissue may be removed by gently insinuating the edge of a spatula.—*Jr. A. M. A.*

#### A SERIES OF STUDIES OF NERVOUS AFFECTIONS IN RELATION TO THE ADJUSTMENTS OF THE EYES.

George T. Stevens (*N. Y. Med. Jr.*, October 15, 1910) proposes to present a short series of studies of nervous affections as related to the adjustments of the eyes, these studies to be based each upon a single case carefully observed for a sufficient length of time to note the phenomena, course of treatment and the results. His first study is that of a case of chronic progressive chorea, the prognosis of which is usually considered to be "absolutely hopeless." The patient was a boy sixteen years of age who was quite thin and pale but was about the usual height for his age. He began showing choreic twitchings when two

years old and did not begin to walk until he was three years of age. In spite of wearing steel braces he walked badly for years and stumbled and fell frequently. When he was six years old the convulsive movements were very marked and his head tipped from side to side. Later he was able to go to school for a week or two at a time. He learned readily but apparently more from what he heard than from what he saw. At the age of nine physicians advised that he be taken out of school and he did not attend school after that. At times he looked "cross-eyed" but this disappeared in time. He was under medical attendance most of the time until seen by the author and had been given the rest treatment in a well known hospital. When seen by Stevens he kept stamping his feet on the floor, clapping his hands, bobbing his head between his knees and performing other wild movements and vocal ejaculations, having no power to control his actions. The muscles of his face and body were constantly in motion. Many of the violent movements and the vocal ejaculations continued through the night. The ophthalmological examination showed no lesion of the fundus. The vision of each eye was 6/6, right without glass, left with +1.25 D.c. av. 90°. Hyperphoria = 0; esophoria = 16°. Rotations were all free and normal except that the upward rotation of 42° was greater than the most favorable rotation in that direction usually. *Declinations*, right +1°, left +6°. The patient could see single, but images were blurred and confused when both eyes were used and diplopia was produced by placing a faintly colored glass before either eye. The treatment was surgical, consisting of operations to correct the *declinations* to which Stevens has given the somewhat contradictory name of *extendocontraction* of a tendon. Seven operations were performed, between July 16, 1907, and July 31, 1908, which resulted in the complete relief of the nervousness and in restoring the patient to such a condition that he was able to work and assist in supporting the family. At his last visit there were 5° of esophoria and the *declination* was, right 0°, left +2°. Stevens believes that the purposeless movements were in the main exaggerations of movements demanded in the eye adjustments rather than that they were *reflex*; and that the movements necessary in the eye adjustments were responsible for the trouble the boy had in walking in early life. In such cases the relation of the child to the floor is like a ship's deck to a novice, he being continually betrayed by his faulty means of localizing the objects before him.

## CAR NAUSEA.

W. McL. Ayres (*Ohio State Med. Jr.*, September, 1910) finds, in an examination of his case records, that 75 patients complained of car sickness, this sometimes being the chief complaint. While it was often associated with headache, asthenopia and stomach trouble, yet it was a marked symptom. Stomach trouble was the most frequent accompaniment. Before thoroughly studying his data Ayres had a decided impression that the majority of the patients would show astigmatism against the rule, either simple or compound, and that the proportion was greater in hyperopic than in myopic astigmatism. Of the 75 patients 30 had plus astigmatism contrary to the rule, and 31 had plus astigmatism with the rule. In his case records he found only 58 having astigmatism against the rule, so that 51 per cent. of patients having astigmatism against the rule suffered with car nausea while only 3 per cent. of those having astigmatism with the rule complained of it. In both simple and compound myopic astigmatism the proportion is much less and only one-fourth of the few cases having myopic astigmatism against the rule complained of car sickness, this being just one-half as many as found in plus astigmatism against the rule. Car sickness was found in every case to be associated with astigmatism either with or without some other form of ametropia; it was found in mixed astigmatism and in 55 per cent. of those unusual cases having astigmatism against the rule in one eye and with the rule in the other. The wearing of correct lenses cured the nausea completely in many cases while in other cases it relieved it very greatly, with only an occasional sensation of nausea on the train. All cases were greatly benefited by the glasses, not only in respect to the train sickness, but also in the relief of vertigo, headache, asthenopia and stomach trouble.

OPHTHALMIA NODOSA OR CATERPILLAR-HAIR  
OPHTHALMIA.

WITH REPORT OF A CASE.

Walter R. Parker (*Jr. A. M. A.*, August 20, 1910) finds reported in the literature thirty-seven cases of caterpillar-hair ophthalmia which he reviews and reports a case of his own. In most of the cases there was a history of injury to the eye by a caterpillar, and where such history is lacking there was sudden

onset of the symptoms consisting of pain, more or less severe, photophobia and lacrimation. These symptoms generally become less marked after a few days but do not disappear entirely. After a few weeks there is an exacerbation of all of the symptoms which continue for a time and then subside gradually again to be followed at a later date by another exacerbation. The period of time between recurrent attacks varied from four days to three years. The tissues of the eye affected were as follows: Conjunctiva, 24 cases; cornea, 18 cases; iris, 16 cases; sclera, 3 cases; episclera, 2 cases; chorioid, 1 case. The first symptoms generally appear soon after the trauma. If the cornea is involved the symptoms are often very severe and consist of the sensation of a foreign body in the eye, itching or burning, with lacrimation and photophobia, all being increased by rubbing. Swelling of the lids, peri-corneal injection and œdema follow. The initial symptoms last as long as the hairs cause irritation, either mechanically or chemically, or until the hairs penetrate the tissue and become encapsulated, which occurs from the fourth to the eighth day according to Teutschlaender. The first nodule or nodules appear about the end of the second or beginning of the third week and the typical stage of ophthalmia nodosa is begun. It is believed that in addition to the mechanical irritant there is also a chemical toxic agent which enters into the cause of the initial symptoms and brings about the recurrent attacks.

Teutschlaender's description of the process is given as follows:

The initial inflammation subsides, some of the hairs being eliminated, while those remaining behind have their mechanico-chemical irritation hindered through the process of infiltration and encapsulation. But so long as the foreign body or its poisonous substance have not been absorbed or eliminated the process is not permanently stopped. Either there is an intensification of the poison, or else the protection of the tissue is weakened. The tissue changes, which during the inflammatory period caused a halt in the work of the ætiologic factor, undergo a certain metamorphosis during the latent period. The œdema and cell infiltration disappear and the protection is lessened. At the same time changes are taking place in the hair. The chitin-layer is being absorbed and larger openings in the medullary canal allow the poison to escape and the chemical agents to accumulate at the inner part of the nodule. When a sufficient amount has accumulated, or the protection is weakened or gone, an irritation is set up and the reaction appears, resulting in a recurrence of

the initial process. This cycle goes on until the poison has all been carried off, when the hair remains in the tissue as an unirritating foreign body.

#### THE ROLE OF OPHTHALMOLOGY IN PREVENTIVE MEDICINE.

Hiram Woods (*Jr. A. M. A.*, Oct. 1, 1910) suggests that the role of ophthalmology in preventive medicine includes at least three phases: 1. Prevention of blindness from infectious diseases and accidents. 2. Prevention of eye deterioration by violation of ocular hygiene. 3. Prevention of remote lesions through recognition of early ocular symptoms of systemic diseases. Of the infectious eye diseases ophthalmia neonatorum is by far the most destructive. As a prophylactic measure Woods recommends a 1 per cent solution of silver nitrate to be dropped into the eyes of new born babes in place of the 2 per cent. as recommended by Cr  d  , as this weaker solution is strong enough to accomplish the purpose if properly used and causes much less irritation.

While about 30 per cent of the blind children in this country are made so by this disease, it is a fact that 75 per cent., or over, of these children so blinded were born under midwife care. Hence the control and education of the midwives is the great problem, especially so since 40 per cent. or more of births are supervised by them. Antiseptic treatment of eye wounds due to industrial accidents is very important and has saved many eyes. The principles of treatment are, removal of foreign bodies, if present, and removable, rest, cleanliness, cold, and meeting complications with appropriate treatment. Physicians should be more active in securing a safe and sane method of observing Fourth of July. While school hygiene has received considerable attention from some quarters it has been sadly neglected in others. The systematic examination of children's eyes for visual acuity, the general recognition of the ocular origin of headache, and the recognition that myopia, certainly the progressive type, is a diseased condition, prevents much suffering and damage to eyes as well as remote disturbances resulting from eyestrain. Woods emphasizes the importance of the adjustable desk in schools and also a modified curriculum for children with diseased eyes or defective vision which would be made worse by excessive use of the eye. This curriculum should include only such studies as are really necessary for a common school education. Maps, diagrams, books, etc., should be large enough to see without effort. The third phase, that of the eye in relation

to systemic diseases, is of great importance.

"To the oculist it is important because the best possible work in his own special line will be nullified unless he recognizes the symptomatic meaning of the trouble bringing his patient to him. To the patient it is important, because even if the oculist relieves symptoms without recognition of cause, relapse is inevitable. To the practitioner it is important because the eye, properly studied, often gives indications not gathered otherwise."

The author says in conclusion:

"The role of ophthalmology in preventive medicine means co-operative medicine. It means that if we view the eye from the standpoint of its own function, this function is often affected by conditions beyond the oculist's power to diagnose or cure; that if ametropia be present, the physician may work in vain to relieve remote symptoms till the oculist helps him; that if the oculist appreciates the meaning of persistent functional disorders, a rigid pupil, seemingly unimportant muscular paresis, he may save his patient from dreadful consequences by asking his brother internist to aid him; that the problem of saving sight is not one which concerns the oculist alone, but is one which demands honest introspection from the physician and effort to educate his patients in the views which medical progress has taught us."

## EXOPHTHALMOS IN BRAIN TUMOR.

WITH REPORT OF EIGHT CASES.

T. H. Weisenburg (*Jr. A. M. A.*, Dec. 3, 1910) states that exophthalmos may be caused by tumors in any part of the cranial cavity. He gives brief abstracts of the histories of eight cases he has observed and draws these conclusions:

1. Exophthalmos accompanies brain tumor more frequently than is generally supposed.
2. It occurs only in those cases in which there is great intracranial pressure, especially when there is in addition direct interference with the normal flow of cerebrospinal fluid.
3. Exophthalmos is produced by direct pressure on the cavernous sinus.
4. Its presence is of some clinical value inasmuch as unilateral exophthalmos is nearly always indicative of an intracranial lesion on the same side.
5. In those cases in which the protrusion is bilateral there is nearly always a greater exophthalmos on the side of the greater intracranial pressure or lesion.

## BOOK REVIEWS.

GLAUCOMA. An inquiry into the physiology and pathology of the intraocular pressure. By Thomson Henderson, M.D. Longman's, Green & Co., New York, 1910.

This book written by a careful and painstaking student whose name is well known to the ophthalmic public, tries to establish new ideas on the intraocular pressure and the nature of glaucoma. Whether the author has succeeded in carrying his point, the reader must judge for himself by studying this highly interesting work. A new explanation of the pathology of glaucoma, which is as yet in the dark, must be welcomed by all students, provided it is based on undoubted facts and succeeds in not only explaining some phases, but all the phases of this disease. The author is satisfied that he can offer such an explanation, which differs materially from previous ones in that it places the whole responsibility on the circulatory apparatus. The book will not only afford a great pleasure, but will also prove to be of very great interest to every one who will carefully study it.

DER INTRAOCULARE FLUESSIGKEITSSTROM IN SEINEN BEZIEHUNGEN ZUM BIOMECHANISCHEN AUFBAU DES AUGES UNTER GESUNDEN VERHÄLTNISSEN, BEIM GLAUKOM UND DER KURZSICHTIGKEIT. (The intraocular current of fluids in its relation to the biomechanical development of the eyeball under normal conditions, to glaucoma and myopia.) With 18 illustrations. By D. I. Kuschel. Berlin. 1910. S. Karger.

As this not rarely occurs, here is a second work which appearing nearly at the same time in public deals like the one of Henderson with the same subject and under another but somewhat similar aspect. Having studied the power of resistance of the different tissues of the eye, and the hydrostatic conditions of the intraocular circulatory apparatus, the author applies the results of these very extensive studies to the explanation of the origin of glaucoma and myopia. He, also, comes to the conclusion that the relation between intraocular blood pressure and the increased or diminished power of resistance in the tissues of the eye gives the explanation of all the phenomena observed in these diseases. This very extensive work deserves careful study which it will amply repay.

THE PHYSICIAN'S VISITING LIST FOR 1911. Philadelphia. P. Blakiston's Son & Co.

This welcome annual visitor celebrates with the present edition its sixtieth birthday. That it has reached this age in the struggle for existence proves it to be of undoubted value to a great many physicians. We congratulate. ALT.

